WHAT IS CLAIMED IS:

1. A process for applying a chromate-free, corrosion resistant coating to a product formed from a magnesium based material, comprising the steps of:

degreasing the product formed from the magnesium based material in a degreasing solution;

cleaning the product formed from the magnesium based material in a highly alkaline cleaning solution;

deoxidizing the product formed from the magnesium based material in a deoxidizing solution; and

immersing the product formed from the magnesium based material in a solution containing phosphate and fluoride ions where a pH level of the solution is controlled in an approximate range of 5 to 7, the solution being provided with 1.0 g/l to 5.0 g/l of an active corrosion inhibitor and being maintained at a temperature of approximately 120 to 200 degrees Fahrenheit while immersing the product formed from the magnesium based material for a period of approximately 15 minutes to 90 minutes.

2. A process according to claim 1, wherein said active corrosion inhibitor is selected from the group consisting of potassium permanganate, sodium tungstate, sodium vanadate, and mixtures thereof and said immersion time is in the range of 25 minutes to 90 minutes.

3. A process according to claim 1, wherein said active corrosion inhibitor comprises from 1.0 g/l to 5.0 g/l sodium vanadate.

4. A process according to claim 1, wherein said active corrosion inhibitor comprises from 2.0 g/l to 5.0 g/l sodium vanadate.

5. A process according to claim 1, wherein said active corrosion inhibitor comprises from 1.0 g/l to 2.0 g/l sodium tungstate.

6. A process according to claim 1, wherein said active corrosion inhibitor comprises from 1.0 g/l to 2.0 g/l potassium permanganate.

7. A process according to claim 1, wherein said solution is provided with from about 0.3 to 0.5 wt% sodium bifluoride.

8. A process according to claim 1, wherein said phosphate and fluoride containing solution further contains 0.01 to 1.0 vol% of a surfactant.

9. A process according to claim 1, wherein said magnesium based material comprises a magnesium alloy.

10. A non-electrolytic process for applying a chromate free, corrosion resistant coating of at least magnesium phosphate and magnesium fluoride to a product formed from a magnesium alloy, comprising the steps of:

degreasing the product formed from the magnesium alloy in a degreasing solution;

cleaning the product formed from the magnesium alloy in a highly alkaline cleaning solution;

deoxidizing the product formed from the magnesium alloy in a deoxidizing solution;

providing a solution containing phosphate and fluoride ions, from about 0.3 to 0.5 wt% sodium bifluoride, and from about 1.0 g/l to 5.0 g/l of an active corrosion inhibitor selected from the group consisting of potassium permanganate, sodium tungstate, sodium vanadate, and mixtures thereof, and having a pH level in the range of 5 to 7;

maintaining said solution at a temperature of approximately 120 to 200 degrees Fahrenheit; and

immersing said product formed from said magnesium alloy in said solution for a time period in the range of 15 minutes to 90 minutes.

11. A process according to claim 10, wherein said phosphate and fluoride containing solution further contains 0.01 to 1.0 vol% of a surfactant.

12. A non-electrolytic process for applying a chromate free, corrosion resistant coating of at least magnesium phosphate to a product formed from a magnesium alloy, comprising the steps of:

degreasing the magnesium alloy product in a degreasing solution;

cleaning the magnesium alloy product in a highly alkaline cleaning solution;

deoxidizing the magnesium alloy product in a deoxidizing solution;

providing a coating solution containing phosphate and fluoride ions and being provided with a concentration of sodium bifluoride in a range of 0.3 to 0.5 wt% and a concentration of an active corrosion inhibitor selected from the group consisting of potassium permanganate, sodium tungstate, sodium vanadate, and mixtures thereof in a concentration of from 1.0 g/l to 5.0 g/l;

maintaining the coating solution at a temperature of 120 to 200 degrees Fahrenheit; and

immersing the magnesium alloy product in the coating solution for a time period in the range of 15 minutes to 90 minutes.

13. A process according to claim 12, wherein said phosphate and fluoride containing solution further contains 0.01 to 1.0 vol% of a surfactant.

14. A solution for use in a process for forming a chromate-free, corrosion resistant coating on a product formed from magnesium or a magnesium alloy, comprising:

said solution having phosphate and fluoride ions;

said solution containing from 1.0 g/l to 5.0 g/l of an active corrosion inhibitor selected from the group consisting of potassium permanganate, sodium tungstate, sodium vanadate, and mixtures thereof; and

said solution having a pH of 5 to 7.

15. A solution according to claim 14, wherein said solution further contains about 1.8 ounces per gallon of monobasic potassium phosphate and about 3.6 ounces per gallon of dibasic potassium phosphate.

16. A solution according to claim 14, further containing from 0.3 to 0.5 wt% sodium bifluoride.

17. A solution according to claim 14, wherein said active corrosion inhibitor comprises from 2.0 g/l to 5.0 g/l sodium vanadate.

18. A solution according to claim 14, wherein said active corrosion inhibitor comprises from 1.0 g/l to 2.0 g/l sodium tungstate.

19. A solution according to claim 14, wherein said active corrosion inhibitor comprises from 1.0 g/l to 2.0 g/l potassium permanganate.

20. A solution according to claim 14, wherein said solution is maintained at a temperature in the range of 120 to 200 degrees Fahrenheit.

21. A solution according to claim 14, further comprising from about 0.1 to 1.0 vol% of a surfactant.